ELECTRONICS

1. An ideal binary 1010.....NRZ signal is passed through a high-pass filter. The time constant of this filter is comparable to the bit duration. The waveform at the output of the filter will

   (i) be a square wave
   (ii) have instantaneous rise and fall time with DC levels showing a ramp
   (iii) be a triangular wave
   (iv) show a rise and fall time with no change in DC values

2. For ground wave communication, the desired antenna polarization is

   (i) horizontal (ii) elliptical
   (iii) vertical (iv) circular

3. The eye in the digital data transmission helps in

   (i) analyzing where sampling is to be done
   (ii) analyzing aliasing error
   (iii) aligning cross over jitter
   (iv) finding the received signal level

4. In an NPN transistor, when emitter junction is forward biased and collector junction is reverse biased, the transistor will operate in

   (i) active region (ii) saturation region
   (iii) cut off region (iv) inverted region

5. The phase comparator in a PLL circuit is used to provide

   (i) one-half the crystal oscillator frequency
   (ii) RF output with modulation
   (iii) DC control voltage
   (iv) Double the crystal oscillator frequency

6. Which of the following modes is used in UHF range propagation ?

   (i) Sky wave (ii) Space wave
   (iii) Surface wave (iv) Ground wave

Which of the following technology results in least power dissipation ?

(i) TTL (ii) ECL
(iii) CMOS (iv) All consume the same power

In a CMOS device power consumption

(i) increases with increasing frequency of operation
(ii) remains constant at all frequencies of operation
(iii) decreases with increasing frequency of operation
(iv) None of the above

Which of the following receivers has amplitude limiters stage ?

(i) AM (ii) FM (iii) Both AM and FM (iv) Neither

The band width required for single-side band suppressed carrier single channel telephony is:

(i) 3 KHz (ii) 10 KHz
(iii) 15 KHz (iv) 20 KHz

For PCM BW = 28 Kz.
$\therefore BW = 68 \log_2 G$ G -> No of Quantization level
fs -> Sampling freq

For a digital communication system, the normally used performance criteria is:

(i) distortion (ii) bit error rate
(iii) frequency response (iv) transmitted power

A transistor operating in a circuit has a case temperature of 85°C and junction temperature of 185°C.
If the junction to case thermal resistance of the device is 2.5°C per watt, then the dissipation in the device is:

(i) 34W (ii) 74W (iii) 250W (iv) 40W

For a certain EPROM, the access time from valid address input to data output is 350nS and from chip select input to data output is 200nS. If the chip select is applied 100nS before applying the address, how much time does it take for data to appear after the chipselect is applied ?

(i) 350nS (ii) 150nS (iii) 200nS (iv) 100nS

1. If a radio transmitter is rated as having frequency accuracy of +/-0.3 ppm, the maximum frequency error at 99 MHz will be

(i) +/- 330 KHz (ii) +/- 300 Hz
(iii) +/- 29.7 KHz (iv) +/- 99 KHz

2. The quantization noise in PCM can be reduced by

(i) increasing the number of bits per sample
(ii) decreasing the number of bits per sample
(iii) increasing the sampling rate
(iv) decreasing the sample rate

3. If the message bandwidth is 15 KHz, frequency deviation is 75 KHz, the approximate transmission band width of FM using Carson's Rule is

(i) 90 KHz (ii) 30 KHz (iii) 150 Khz (iv) 180 KHz

4. Capture effect is a phenomenon observed in

(i) AM modulation (ii) FM modulation
(iii) Both AM & FM (iv) None of the above

5. The spectrum of a Dirac delta function looks like

(i) vertical line at 0 (Zero) (ii) horizontal line
(iii) sinusoidal (iv) None of the above

6. If the probabilities of two mutually exclusive events A and B are P(A) and P(B) respectively, then the probability of one of them occurring is

(i) P(A) P(B) (ii) P(A) + P(B) P(A) P(B)
(iii) P(A) + P(B) (iv) 0

7. In a two stage amplifier, the first stage has a gain of 10, and noise figure of 8, and the second stage has a gain of 15 and a noise figure of 10. The overall noise figure is

(i) 230 (ii) 8.9 (iii) 3.75 (iv) 23

8. To overcome aliasing effects in sampling operations, one of the methods used is

(i) increasing the sampling rate
(ii) decreasing the sampling rate
(iii) increasing the bandwidth
(iv) increasing the amplitude

14. In delta modulation the transmitted pulses carry the information corresponding to

(i) absolute quantised signal amplitude
(ii) derivative of the amplitude of the modulating signal
(iii) the frequency of the modulating signal
(iv) the deviation of the phase of the modulating signal

15. Digital data at 2400 bps is transmitted using QPSK. What is the baud rate ?

(i) 2400 (ii) 600 (iii) 1200 (iv) 300

16. The number of bits per sample in delta modulation is

(i) 8 (ii) 4 (iii) 1 (iv) None of the above

17. Dipole antenna is generally used in HF for

(i) sky wave communication
(ii) ground wave communication
(iii) Satellite communication
(iv) None of the above

18. Which of the following statements is false for a FM communication ?

(i) It results in low bandwidth
(ii) Discriminator is used for demodulation
(iii) Higher noise immunity than AM
(iv) Limiters are used in receiver

19. If the probability of message is 1 in 4, then the information will be

(i) 1 bit (ii) 2 bits (iii) 4 bits (iv) 16 bits

20. Image frequency rejection mainly depends on

(i) RF (ii) Mixer (iii) Detector (iv) IF

29. If a digital transmission system uses (7,3) Hamming code, the information rate is

(i) 3/7 (ii) 7/10 (iii) 4/7 (iv) 3/10

30. In a PCM system, the signal-to-quantization noise ratio increases for every bit increase in the code word length by an amount of

(i) 3 dB (ii) 10 dB (iii) 20 dB (iv) 6 dB

31. An envelope detector is used to demodulate the signal in

(i) FM (ii) AM (iii) PM (iv) SSB

32. Electron mobility in GaAs FET is

(i) higher than in Si BJT
(ii) lower than in Si BJT
(iii) same as in Si BJT
(iv) None of the above

33. Skin depth represents the penetration of current flow in a conductor and is a function of frequency and resistivity of the conducting material

(i) skin depth increases with frequency and resistivity
(ii) skin depth increases with resistivity and decreases with frequency
(iii) skin depth increases with frequency and decreases with resistivity
(iv) skin depth decreases with frequency and resistivity

$\delta = \sqrt{\frac{2}{\omega\mu\sigma}}$

ω - Radian Freq.

μ = Permeability of medium

σ = Conductivity of medium

34. In a particular transmission line the standing wave ratio was found to be infinite. The load impedance then had to be

(i) open circuit (ii) short circuit
(iii) purely reactive (iv) any of the above

$\frac{Z_L - Z_0}{Z_L + Z_0} = 1$

35. PIN diodes find applications as follows: (Choose the incorrect answer)

(i) amplifiers (ii) modulators
(iii) attenuators (iv) phase shifters

$C = \frac{\epsilon A}{W}$

A = Junction Area

W = I-Region thickness

$f_x = \frac{1}{2\pi\rho\epsilon}$

ρ - I Region Resistivity

36. For any amplifier, its intercept point is

(i) higher than its 1dB compression point
(ii) lower than its 1dB compression point
(iii) same as its 1dB compression point
(iv) None of the above

37. A point on the Smith chart has an impedance X+jY. To know the admittance at this point from the Smith chart, one has to move from the point along the circumference of the chart for an angle of

(i) 360° (ii) 180° (iii) 90° (iv) 45°

38. Plus 43 dBm power level in a 50 ohm system is equivalent to

(i) 43 milliwatts (ii) 43 watts
(iii) 200 milliwatts (iv) 20 watts

39. SAW devices are mainly used as

(i) Filters (ii) Detectors
(iii) Amplifiers (iv) Switching elements

40. The characteristic impedance in a coaxial cable with a given dielectric is mainly dependent on

(i) Frequency of the signal
(ii) Power of the signal
(iii) diameters of the conductors
(iv) Materials of the conductors used

41. Quarterwave transformers are used to match load impedance to source impedance at given centre frequency. In order to perfectly match a 100 ohm source to a 50 ohm load, the characteristic impedance of the quarterwave transformer should be

(i) 150 ohm (ii) 70.7 ohm (iii) 50 ohm (iv) 35.3 ohm

42. MODFETs are increasingly being used at higher RF frequencies. MODFET stands for

(i) Metal Oxide Dielectric Field Effect Transistor
(ii) Metal Organic Discharge Field Effect Transistor
(iii) Modulation Doped Field Effect Transistor
(iv) None of the above

43. In cellular radio networks FDMA is most commonly used. FDMA in this context stands for

(i) Frequency Diversity Monopulse Antenna
(ii) Frequency Division Multiple Access
(iii) FET Driven Monolithic Amplifier
(iv) None of the above

44. The sidelobes in an antenna pattern can be reduced by

(i) increasing the size of the antenna
(ii) reducing the size of the antenna
(iii) using different antennas for transmission and reception
(iv) tapering the amplitude of excitation

45. In a two stage amplifier, the first stage has a gain of 10dB with noise figure of 1.5 dB. The second stage has a gain of 17 dB with a noise figure of 3 dB. The overall cascaded noise figure is then

(i) 2.55 dB (ii) 3.2 dB (iii) 1.79 dB (iv) 1.51 dB

46. Step recovery diodes are generally used for

(i) High order frequency multiplication
(ii) Power detection
(iii) Attenuation
(iv) Modulation

47. On a Smith chart a point 'A' with impedance X + iY is given. A circle centred around the centre of the Smith chart and passing through point 'A' is drawn. The locus of a point along this circle represents

(i) Constant impedance
(ii) Constant VSWR
(iii) Reactive part of the load
(iv) Resistive part of the load

48. Charge of an electron is

(i) 1.6×10^{-19} Coulombs (ii) 8.854×10^{-12} Farads/Meter
(iii) 9.1×10^{-31} Coulombs (iv) 1.6×10^{-19} Farads/Meter

49. A superheterodyne receiver with an IF of 450 KHz is tuned to a signal of 1400 KHz. The image frequency is

(i) 1850 KHz (ii) 2300 KHz (iii) 950 Khz (iv) 1900 Khz

1400 + 450 x 2 = 2300

50. Ferrite is a

(i) Non conductor with magnetic properties
(ii) Superconductor
(iii) Insulator which attenuates magnetic fields
(iv) Microwave Semiconductor

51. Given a junction VSWR of 2.0 and input power of 17 dBm, the power reflected back is

(i) 5.56 milliwatts (ii) 15 dBm
(iii) 8.5 milliwatts (iv) 10 milliwatts

52. The decimal number 184 is equivalent to the BCD number

(i) 000110000100 (ii) 100010000100
(iii) 000000011100 (iv) None of the above

53. The hexadecimal equivalent of the product of the two hexadecimal numbers AB and CD is

(i) ABCD (ii) BCAB (iii) 8AAE (iv) 88EE

54. The binary number 101.101 is equivalent to the decimal number

(i) 5.5 (ii) 5.625 (iii) 5.125 (iv) 5.1

55. The propagation delay in a TTL gate (such as a 7400) is typically

(i) 10 nanoseconds (ii) 10 picoseconds
(iii) 1 microsecond (iv) 1 millisecond

56. Hysteresis is a property of

(i) all logic circuits (ii) all TTL circuits
(iii) only MOS circuits (iv) Schmitt-Trigger circuits

57. Any combinational circuit can be realised using

(i) only OR circuits (ii) only AND circuits
(iii) only NAND circuits (iv) None of the above

58. In JK flip flops if the input to K is the complement of the input to J, then the flip flop can function as a

(i) SR flip flop (ii) D - flip flop
(iii) T - flip flop (iv) None of the above

59. Using only T flip flops and no other components, one may construct

(i) synchronous counter (ii) a ripple counter
(iii) a ring counter (iv) None of the above

60. In the 8085 microprocessor, the accumulator is

(i) 8-bit wide (ii) 16-bit wide
(iii) 4-bit wide (iv) None of the above

61. The signal provided on the 8085 for latching addresses is
(i) RD (ii) WR (iii) READY (iv) ALE

62. A modulo 20 counter can be built with a minimum of

(i) 20 flip flops (ii) 10 flip flops
(iii) 5 flip flops (iv) 4 flip flops

63. The collector-to-emitter voltage VCE in a bipolar small signal transistor in saturation is typically

(i) 2 V (ii) 0.2 V (iii) 1 V (iv) 1.2 V

64. DRAM is a type of memory - made up of MOS transistors
SRAM - made up of F/Fs

(i) requiring periodic refresh
(ii) retains data when power is removed
(iii) both (i) and (ii)
(iv) None of the above

65. In a 2-input TTL NAND gate if one input is connected to the output, then the output will be

(i) logic (high) always
(ii) logic (high) only when the second input is high
(iii) oscillates when second input is high
(iv) logic 0 (low) second input is low

66. In the 8085, asserting the RESET input causes

(i) the accumulator to be set to zero
(ii) the program counter to be set to zero
(iii) all internal registers except PC to be set to zero
(iv) None of the above

(10)

67. Which of the following equation illustrates De Morgan's theorem

(i) $\overline{A.B} = A + B$

(ii) $\overline{A.B} = \bar{A} + \bar{B}$

(iii) $\bar{A}.\bar{B} = \bar{A} + \bar{B}$

(iv) None of the above

68. A bipolar transistor when used as a switch will be generally working in

(i) Active region only
(ii) Cut-off region only
(iii) Active and Saturation regions
(iv) Cut-off and Saturation regions

69. The number of standard loads that can be connected to one output of a digital circuit is called

(i) Fan-in (ii) Fan-out
(iii) Loading factor (iv) None of the above

70. When the outputs of open-collector-output of two or more inverters are tied together alongwith a pull-up resistor pulled up to VCC, the resulting function is a

(i) Wirod AND (ii) Wired OR
(iii) Wired NOR (iv) None of the above

71. A State Machine whose outputs change only when a clock 'tick' occurs is

(i) A synchronous combinational circuit
(ii) A synchronous sequential circuit
(iii) An asynchronous sequential circuit
(iv) None of the above

72. The term 'PLD' in digital circuits refers to

(i) Power Load Dynamics
(ii) Parity Low Detectors
(iii) Programmable Logic Devices
(iv) None of the above

73. In a micro-processor based design, the data bus is usually

(i) unidirectional (ii) bidirectional
(iii) neither (i) nor (ii) (iv) None of the above

74. CMOS circuits generally consume

(i) more power than ECL circuits
(ii) less power than ECL circuits
(iii) same power as ECL circuits
(iv) None of the above

75. In Gray code

(i) two bits change for each successive value
(ii) one bit changes for each successive value
(iii) any number of bits can change for each successive value
(iv) None of the above

76. To use a D-Flip flop as a T-flip flop

(i) the Q output must be connected to the D-input

(ii) the $\overline{Q}$ output must be connected to the D-input

(iii) the Q and $\overline{Q}$ outputs must be shorted

(iv) None of the above

77. ECL logic circuits are generally

(i) Slower than TTL circuits
(ii) Slower than CMOS circuits
(iii) Faster than TTL circuits
(iv) None of the above

78. A 24-line to 1-line digital multiplexer needs

(i) 5 control inputs (ii) 12 control inputs
(iii) 6 control inputs (iv) None of the above

79. Parity circuits are used for

(i) detecting errors in transmission of digital data
(ii) comparing two sets of data
(iii) computing sum of two bits of data
(iv) All of the above

80. A 2-input Exclusive Or gate can

(i) generate sum of two bits with carry
(ii) can generate sum of two bits but no carry
(iii) multiply two inputs
(iv) All of the above

81. The following program code is for a single address (single operational instruction) computer with one accumulator register. Assume that there are no overflows in computation

```
LOAD C
ADD C
ADD C
MUL C
STORE T1
ADD A
STORE T2
LOAD T1
MUL T2
STORE Z
```

The result of the above is

(i) $Z = 3C^2 + 3C^4A$ (ii) $Z = 3C^2A + 9C^4$
(iii) $Z = A + 9C^4$ (iv) None of the above

82. It is possible to build a bistable latch with

(i) two 2-input NAND gates (ii) two 2-input NOR gates
(iii) both (i) and (ii) above (iv) None of the above

83. The magnitude of the signal power due to a target at the receiver of a mono-static radar is

(i) directly proportional to the range of the target
(ii) inversely proportional to the range of the target
(iii) proportional to the $(1/R)^3$, where 'R' is the target range
(iv) proportional to the $(1/R)^4$, where 'R' is the target range

84. A coherent Radar is one in which
(i) TWT is used
(ii) FFT processor is used
(iii) The operation is based on phase information of the signal
(iv) Transmitted signal is frequency modulated

85. Dynamic Range of a radar receiver is a measure of its
(i) Ability to determine the range of a dynamic target
(ii) Adaptability to changing environment
(iii) Ability to handle signals of varying strengths without getting into saturation
(iv) Ability to distinguish between the noise and clutter

86. The intrinsic range resolution of a radar depends on its

(i) PRF (ii) Peak power output
(iii) Pulse width (iv) Receiver Sensitivity

87. The primary goal of use of a Matched filter in a Radar System is to achieve

(i) Matching of antenna base point impedance with the wave guide
(ii) Optimum S/N improvement
(iii) Compensation of wave guide impedance mismatches
(iv) Matching the display with the Receiver

88. Among the following types of Transmitting tubes which one is not suitable for implementation of a fully coherent radar ?

(i) Klystron (ii) TWT
(iii) Magnetron (iv) Cross Field Amplifier (CF(I) CFA)

89. Amplitude and phase spectrums of an analytic signal are

(i) Fourier transform pairs
(ii) Hilbert transform pairs
(iii) Laplace transform pairs
(iv) Not related at all

90. PPI Display stands for

(i) Pulse Position Integration
(ii) Plan Position Indicator
(iii) Peak Pulse Indication
(iv) None of the above

91. The Navigational Radars are generally operated in

(i) S Band (ii) C Band (iii) X Band (iv) Ku Band

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92. The ability of a Radar to distinguish two targets which are close by is known as

(i) accuracy (ii) resolution
(iii) sensitivity (iv) selectivity

93. The range resolution of a radar with a pulse width of 1 microsecond is

(i) 75 m (ii) 100 m (iii) 150 m (iv) 300 m

94. The bearing accuracy of a radar depends on

(i) Pulse width (ii) the beam width
(iii) the p.r.f. (iv) the velocity of target

95. If the p.r.f. is 1000, the interval between pulses is

(i) 50 microseconds (ii) 500 microseconds
(iii) 1000 microseconds (iv) 2000 microseconds

PRI = $\frac{1}{1000}$

= 1000 μsec

96. The noise in a radar receiver is directly proportional to

(i) Plank's constant
(ii) Band width of the receiver
(iii) Dielectric constant of the material of antenna
(iv) Dielectric constant of troposphere

$N_1 = K T_0 B$

K Plank's Const = 1.38×10^{-23} J/

97. If the transmitted power is doubled, for similar conditions, the range of the radar increases by nearly

(i) 20% (ii) 40% (iii) 75% (iv) 100%

98. Magnetron is a microwave frequency

(i) Amplifier (ii) High Power oscillator
(iii) Modulator (iv) Detector

99. The magnetic field in a magnetron is always

(i) parallel to the electric field
(ii) parallel to the electron motion
(iii) parallel to the electric field and electron motion
(iv) perpendicular to the electric field and electron motion

100. The radiation pattern of an antenna is _____ of the aperture current distribution

(i) Laplace transform
(ii) Fourier transform
(iii) Z transform simultaneous operation
(iv) No relation

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